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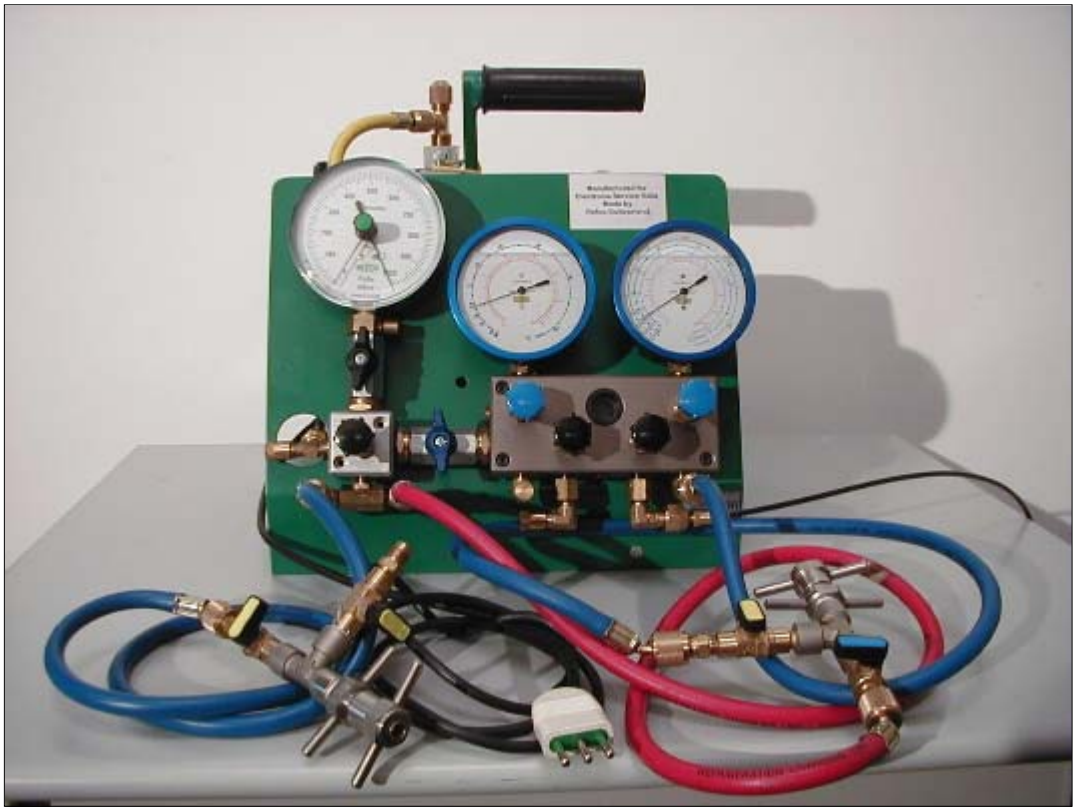
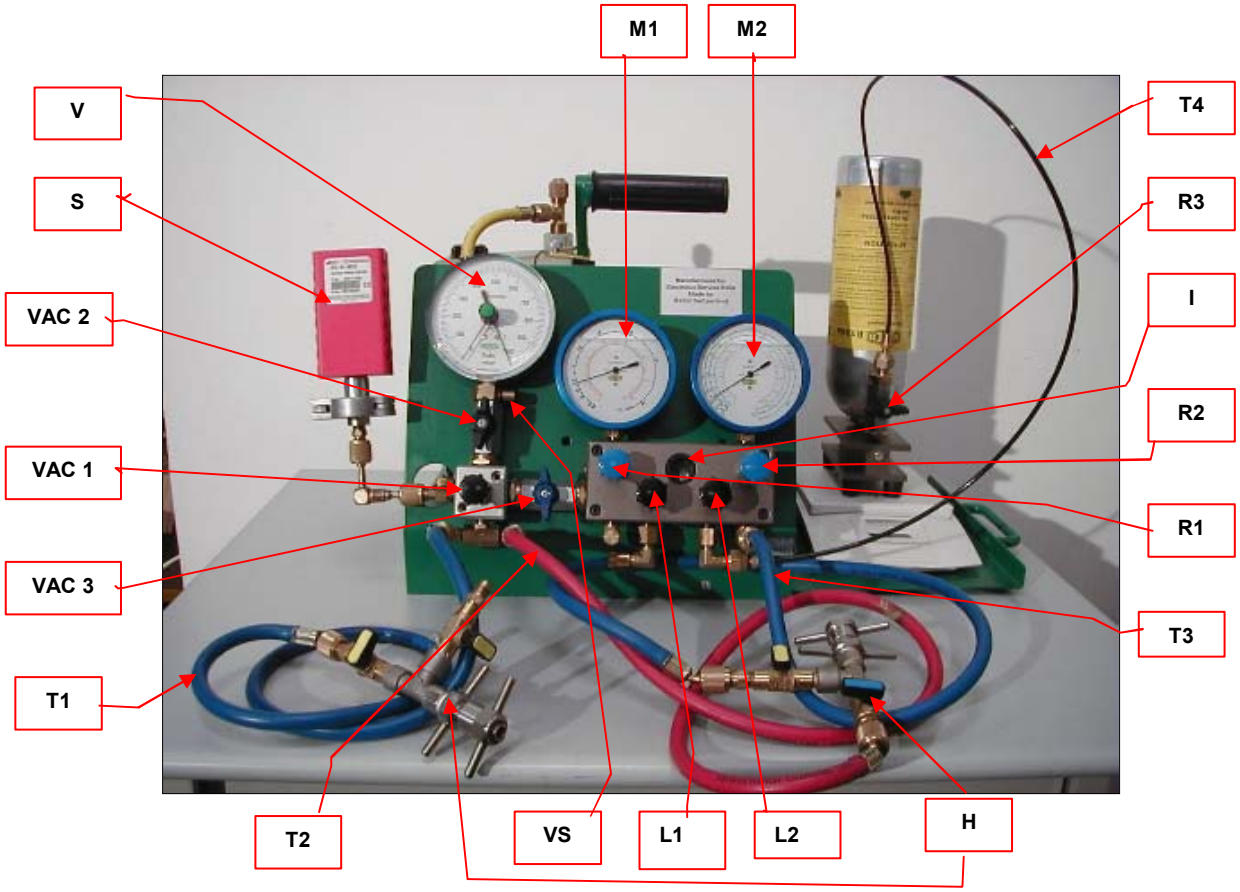
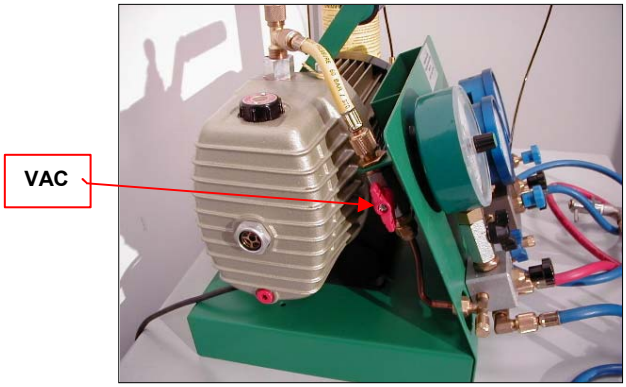


© ELECTROLUX ZANUSSI ELETTRODOMESTICI S.p.A. VIA GIARDINI CATTANEO, 3	Publication number		**ES-1 Coolant loading unit** **Functional characteristics**	
I - 33170 PORDENONE (ITALY)	**599 34 45 79**			
Fax (0434) 394096	001030 EN/SERVICE/MI			

NEW ES-1 COOLANT LOADING UNIT





T1: vacuum line T2: vacuum line T3: loading line (R134a/R600a) T4: connector tube between loading unit and coolant cylinder support (R134a/R600a) L1: valve for separation of R134a section and R600a section L1: valve for separation of R600a vacuum section and R600a section VAC: valve for separation of pump and vacuum section VAC1: valve for vacuum lines T1-T2 VAC2: vacuometer valve VAC3: valve for separation of vacuum/load section VS: pressure gauge safety valve	V: mechanical vacuometer M1: low-pressure pressure gauge (R600a) M2: low-pressure pressure gauge (R134a) R1: pressure gauge valve (R134a) R2: pressure gauge valve (R600a) R3: valve on coolant cylinder support S: vacuum sensor (future applications) I: liquid gas flow indicator H: three-way coupling (future applications)

INTRODUCTION

Separation of the vacuum section from the loading section

During vacuum operations, any residue and pollutants present in the cooling circuit tend to accumulate in the tubes and the circuit of the coolant loading unit. On the old type of units, the gas flows through the same section and the same tube connected to the low-pressure section, drawing all the residue and pollutants that have accumulated during vacuum operations into the cooling circuit.

The design of the new unit is based on the separation of the vacuum section from the loading section (by valve **VAC3**). This prevents the residue and pollutants that accumulate in the lines and in the vacuum section during pumping operations from re-entering the cooling circuit together with the cooling gas during the coolant loading phase.

In view of the necessity of increased precision in the quantity of gas loaded, the loading cylinder for R134a has been eliminated; in this way, the unit becomes more flexible, and is able to operate in identical conditions with both R134a circuits and R600a circuits.

Vacuum operations in R134a and R600a circuits

The ester oil present in R134a circuits is chemically incompatible with the mineral oil used in R600a circuits. Therefore, in order to avoid mixing the oils that accumulate in the circuit and in vacuum lines **T1** and **T2** during vacuum operations on an R134a circuit with mineral oil accumulating during the same operations on an R600a circuit, it is advisable to use two separate tubes, one for use with R134a and the other for use with R600a.

In addition, in order to avoid mixing the oils in the vacuum section, it is necessary to clean the section (using a flow of liquid gas) using R134a. Obviously, valves **L1** and **L2** and **VAC3** must be opened during this procedure. **Close VAC2 and VAC, open the valves of the three-way couplings or unscrew the Hansen couplings**.

The sections in the loading circuit, it will be seen, never come into contact with residue, pollutants or oil.

CHARACTERISTICS

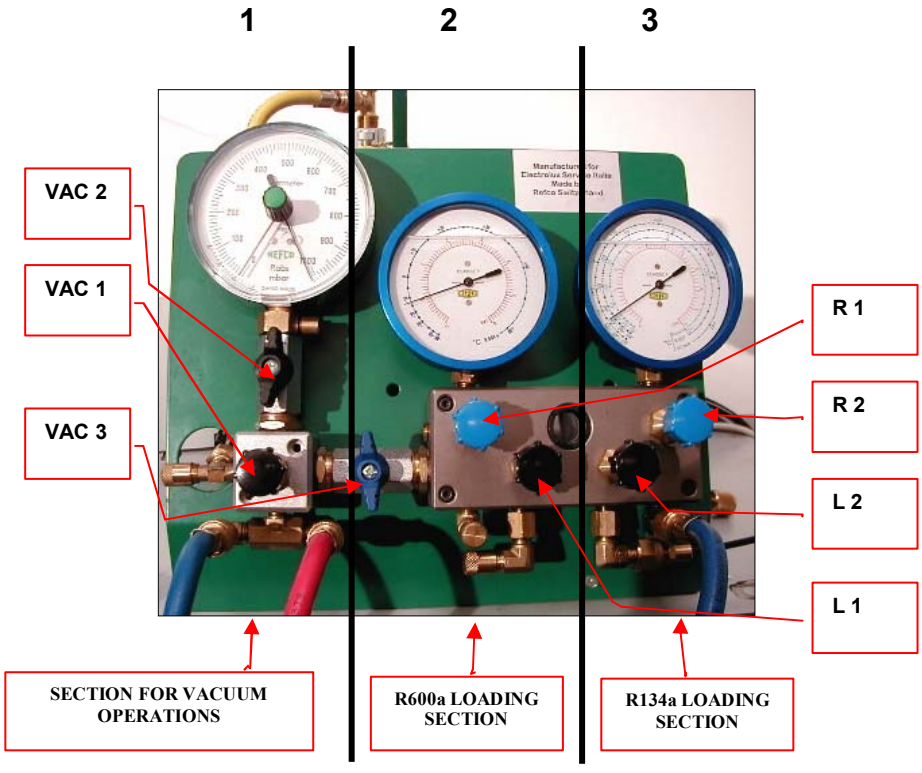
Sections of the coolant loading unit

The loading unit consists of three sections:

1. Section for vacuum operations
2. Section for loading with R600a
3. Section for loading with R134a.

The section for vacuum operations can be separated from the R600a loading section by closing valve **VAC3**.

The sections for loading with R600a and/or R134a can be separated from each other by closing valves **L1** and **L2**.



Location of leaks

Separation of the various sections and the use of the various valves makes it possible to identify the part of the loading unit where the leak occurs. The following pages contain a step-by-step description of the procedure used to check for and identify possible leaks.

CHECKING THE LOADING UNIT FOR LEAKS

The procedure used to check the loading unit for leaks consists of an initial inspection of the levels indicated by the pressure gauges in order to ensure that the circuit does not contain pressurized gas; the second phase consists of a vacuometer check, which may be performed using the mechanical vacuometer fitted to the loading unit itself or, if preferred, a digital vacuometer. Naturally, the reading provided by the digital vacuometer will be more accurate than is possible with the mechanical version; this may therefore be considered to be a further check.

N.B.: The Hansen or three-way couplings, too, are subject to leaks. Therefore, the checks described in this document must all be carried out with the couplings fitted to the R134a and R600a loading lines (tubes **T4** and **T3**) and on the vacuum lines (tubes **T1** and **T2**).

Visual inspection of low-pressure manometers

a) The initial situation assumes that the last operation performed using the loading unit was a coolant load (R134a or R600a), therefore that vacuum lines **T1** and **T2**, load line **T3** and tube **T4** are correctly connected and complete with Hansen or three-way couplings, that valves **L1** and **L2** are closed, valve **VAC2** (which protects the vacuometer) and valve **VAC** (which excludes the pump) are closed.

b) First, inspect pressure gauges **M1** and **M2** to check that the loading sections **1** and **2** of the circuit are not pressurized by the gas loaded previously. Then check that the pressure shown on the low-pressure pressure gauge for the R134a or the R600a is not in excess of zero.

   If the pressure gauge reading indicates a pressure that is greater than zero, i.e. that the circuit contains residual pressurized gas, it is necessary to drain off this residual gas through the load lines **T3** by loosening the female Hansen coupling or (in the case of a three-way coupling) by opening the valve. When the low-pressure pressure gauge indicates zero, re-tighten the coupling.

c) Open valves **L1, L2, VAC1, VAC3 and VAC2** in order to place the sections in communication with each other.

d) Switch on the pump.

e) Open valve **VAC**, which intercepts the tube between the pump and the vacuum section.

f) After about one minute, check that the low-pressure pressure gauge indicates the minimum reading (i.e. –1 bar).

N.B. The purpose of this initial phase of the control procedure is to ensure that the circuit contains no pressure that might damage the vacuometer. Consequently, the vacuometer must **never** be used during this phase (valve **VAC** must always remain closed).

Check using mechanical vacuometer (with the pump in operation)

g) Open **VAC2** and check that the vacuometer indicator moves to the "maximum vacuum" position (i.e. the rightmost position, towards the end of the scale, at which the pointer stops and stabilizes with the pump in operation).

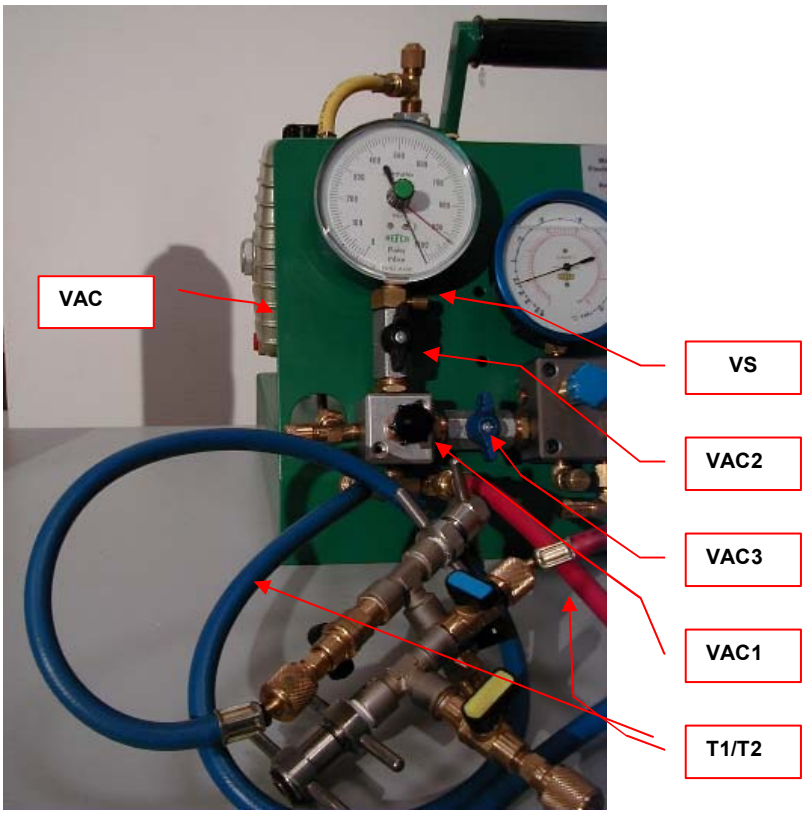
h) If the "maximum vacuum" position is reached (i.e. if the pointer stops on zero), proceed to step **i)**.
   Otherwise, if the vacuometer pointer does not reach zero, this means that there is a relatively significant leak or that it is necessary to change the oil (which reduces the efficiency of the pump).

   In this case, all parts of the loading unit must be checked, one by one, as described in step **m)** in order to identify the leak. If no leaks are found, the oil should be changed (even if it has been changed recently).

i) Wait a few minutes (about 3 to 5), then close **VAC** in order to exclude the pump.

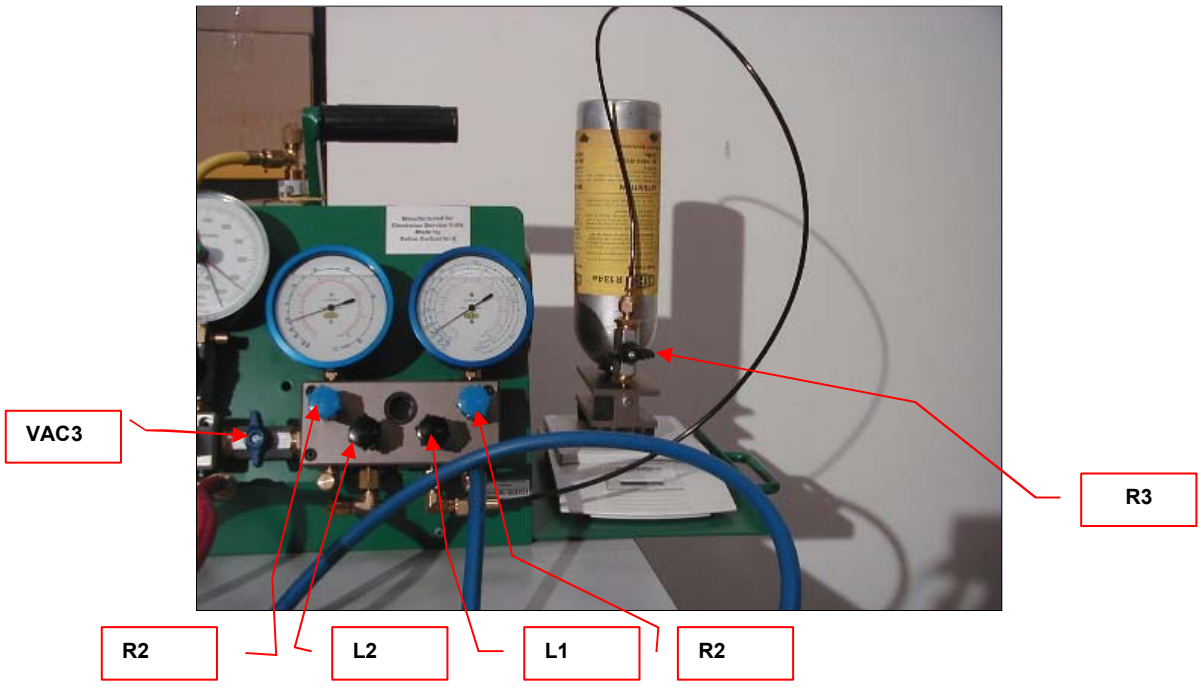
l) Wait a few more minutes and check that the pointer on the vacuometer does not start to rise. If the pointer remains stationary, then there are no leaks in the circuit, otherwise proceed from to **m)**.

m) Localization of the leak (with the pump in operation):

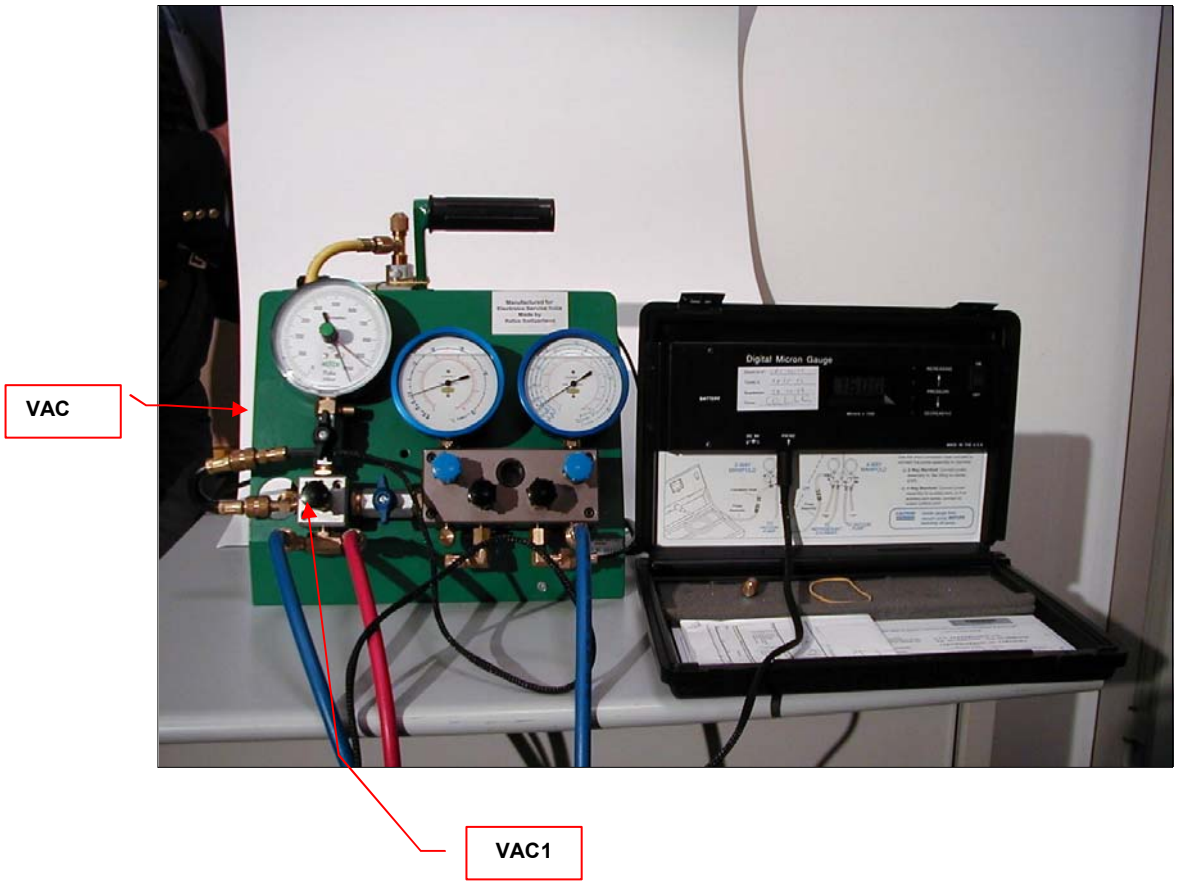


1) Vacuum section: with valve **VAC3** closed, check for leaks:
a) in the connections between the vacuum line (**T1** and **T2**) and the section of the circuit (the valves must be securely tightened and the seal inside the tube must be efficient).
b) in the connections between the vacuometer and the loading unit.
c) in safety valve **VS**.
d) in vacuum lines **T1** and **T2**.
e) in the Hansen or three-way couplings (with valves closed) connected to vacuum lines **T1** and **T2**.

2) T600a / R134a section: with valve **VAC3** open, check for leaks:
a) in the connections between load line **T3** and the loading unit.
b) in the connection between the pressure gauge and the section of the circuit.
c) In the connections between the R600a section and the two adjacent sections (vacuum and R134a).
d) in the connection between loading tube **T4**-cylinder support/loading section.
e) in loading line **T3** (R134a/R600a) with the valve closed.
f) in the Hansen coupling connected to loading line **T3**.
g) in tube **T4** attached to the R600a/R134a cylinder (open **L1** and/or **L2**).



Check using digital vacuometer (with the pump in operation)



g) Open **VAC** and **VAC1** leaving **VAC2** closed and wait until the "maximum vacuum" position is reached; these pumps reach a maximum vacuum of **0.350 mmHg** (indication on TIF vacuometers); however, the pressure may be lower, depending on the performance of the pump.

h) If the "maximum vacuum" position is reached, proceed to step **i)**, otherwise, there is either a major leak or the oil requires changing. In this case, first check for the existence of a leak as described in step **m)**; if no leaks are found, the oil must be changed (even if it has been changed recently).

i) Wait for two minutes, then close **VAC** in order to exclude the pump. Record the "maximum vacuum" position indicated by the vacuometer at the moment of closing **VAC**; this value indicates the maximum vacuum reached.

l) Wait for one or two minutes: during this period, the reading indicated by the digital vacuometer will rise even if there are no leaks, because the instrument can detect the slight increase in pressure that occurs in all loading units. However, this increase must be gradual rather than rapid. In other words, over a period of about two minutes, the pressure should not increase beyond **1.5 mmHg** more than the "maximum vacuum" value reached previously; i.e. the value indicated must be less than "**maximum vacuum**" + **1.5 mmHg**. If this is not the case, there is a leak which must be localized as described in step **m)** of the procedure using a mechanical vacuometer.

Example: After about two minutes of operation of the pump, the value indicated by the vacuometer is stable at a "maximum vacuum" of 0.350 mmHg. Close **VAC** to exclude the pump and wait another couple of minutes to see how rapidly the value indicated by the digital vacuometer rises. If, after two minutes, the value indicated is less than 0.350 ("maximum vacuum") + 1.5 (pressure increase) = 1.850 mmHg, then there are no leaks from the loading unit.

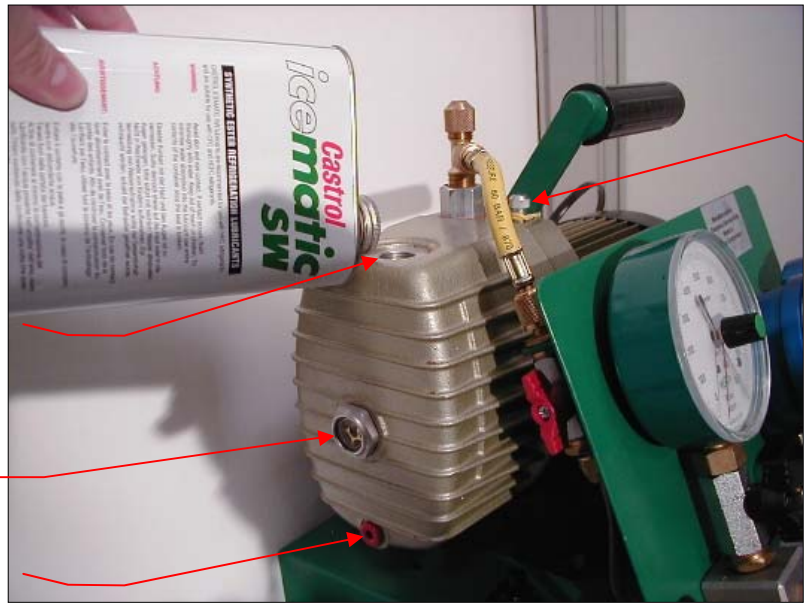
If the procedures described in step h) or step m) do not have any effect, it is advisable to return the loading unit to the manufacturer for repairs.

N.B. It is advisable to perform the procedure for checking the tightness of the loading unit more than once, in order to avoid random errors.

OIL CHANGES

Procedure for changing the oil

1) Remove filler cap **C**.
2) Remove screw **B** to drain the used oil.
3) Replace and tighten screw **B** and fill with fresh oil until the level reaches the midway point of the level indicator (**A**).



Frequency of oil changes

If the pump is used only once daily, the oil should be changed monthly.
However, it is necessary to take into consideration the conditions of the circuit in which the vacuum is created. For example, in the case of a damaged roll-bond evaporator into which water has penetrated, the oil must be changed after each intervention.
In addition, even if the pump is not utilized, the oil absorbs humidity and must in any case be changed.

****Degassing valve/steam vent: unscrew by between 1/4 turn and 1 turn (maximum) to degas if the circuit contains humidity or residual gas during the final phase of draining in order to reach the "maximum vacuum" level.**

COMPONENTS INCLUDED IN THE LOADING UNIT KIT

1) Support for liquid gas cylinder (**A**).
2) Electronic precision balance (**B**).
3) Gas loading tube (**C**).